Incorporating "The Illuminating Engineer."

Light and Lighting

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Principal Contents:

We Cannot See Light....

WE Cannot See Light. A reminder of this fact formed the opening sentence in a recent brochure issued by one of the leading firms in the lighting industry (see "Light and Lighting," February, 1940, page 36). We can only see the objects made visible by the sources of light which we install.

How important, therefore, not only to direct the light to the best advantage but to exercise judgment in the selection of materials on which it falls.

At the joint meeting of the I.E.S. and the Society of Chemical Industry on April 2, this point was emphasised by the lecturer, Mr. J. M. Waldram. However great the skill we apply to the design and location of street-lighting units our efforts are fruitless unless we take into consideration the quality of the road surface on which the light falls—at present often determined without much consideration of appearance by night.

And during "black out" conditions, how important to have some control of surfaces illuminated by the meagre amount of light furnished in our streets. We cannot see this light. We see only, faintly visible, the pavement and the roadway, the kerb, the crossing and the lamp-post, the car and the pedestrian, on which the light falls. Surely our task should now be, having obtained this agreed measure of light, to adjust so far as we can the reflecting powers of objects so as to obtain maximum contrast and ensure maximum visibility—visibility that is to our eyes and not to observation from above.

Forthcoming I.E.S. Annual Meeting

The I.E.S. is coming to the end of an eventful session, and the annual general meeting has been announced to take place on May 7. On this occasion there are several new departures. Instead of the customary address by an expert from abroad, three papers on closely related photometric topics are announced. For the first time an informal luncheon is being arranged at St. Ermin's Hotel, which in some degree will be a compensation for the loss of the annual dinner. We have no doubt that members will be well satisfied by the record contained in the annual report. The Society has, indeed, done marvellously well considering the dislocation caused by the war. Both officers and members deserve congratulation—the former for their determination to maintain the organisation of the Society and their enterprise in putting its services at the disposal of the authorities; the latter for at once responding to the call and showing that their interest in the Society is in no way abated.

0.002 Foot-Candles

This low value of illumination (though not so minute as that furnished by "synthetic moonlight" in the streets) is the subject of definite reference in the Lighting Restrictions Order, but the conditions under which its use is permissible are still imperfectly understood. The wording of the Order rather implies that it is intended primarily for docks and railways, but it is, in fact, being adopted in many other cases to facilitate access to areas where night work is done or where some operation associated with transport is involved. It should also not be overlooked that the Order makes provision for the illumination of stalls and uncovered markets (without, however, stating the illumination permitted), so that lighting facilities for processes involving sales may also be sought. A case that has recently been brought to our notice, that of road service and petrol stations, would seem to come under both clauses. It is obviously desirable that there should be some illumination to enable cars to draw in safely and make possible the handling of pumps and exchange of coupons and cash. We understand that in such cases there should be no difficulty in getting sanction to install fittings to furnish illumination to the 0.002 level, though requirements in regard to the screening of lights must be met and the permission of the local chief officer of police secured.

The Technique of Fluorescent Lighting

The remarkable new fluorescent tubular lamp announced in our last issue (March, p. 51) is an outstanding example of possibilities in the field of fluorescent lighting. Apart from the efficiency and quality of the light, it has one other useful property —that all the u.v. radiation is converted into light by the surrounding fluorescent envelope, so that none escapes. This leads us to mention one important element in the technique of fluorescent lighting—the avoidance of "spillage" of u.v. radiation. In the present circumstances there should be remarkable opportunities for fluorescent effects. It is necessary, however, to meet the requirements of the authorities who will not countenance the emission of u.v. radiation into the streets. It is also a fundamental aim to avoid, so far as possible, any direct radiation striking the eyes of people and thus giving rise to the troublesome "luminous haze" occasioned by fluorescence of the eye lens. It is comparatively easy to ensure no direct radiation entering the eye, but it is also expedient to limit even diffusely reflected radiation of this nature. Sound principles of illuminating engineering demand that *all* u.v. radiation should be usefully applied. Any stray unconverted radiation is therefore so much waste. There is evidently scope for design here. The emitted flux should be confined to the fluorescent area it is intended to excite. It may well be worth while to devote special attention to the background, with a view to ensuring that u.v. radiation falling on it is completely quenched—in other words, we want a material that fluoresces black! Those who witnessed the demonstrations at the last I.E.S. meeting on April 9, and particularly the effective exhibit of Mr. H. D. Harris, must have been struck by the spectacular gain through the increased contrast—this was well shown in the appearance of a lampholder, which, in fluorescent material, really looks like brass—instead of yellow paper, as in the illuminated painting, shown in comparison. Fluorescent nameplates, notices, and designs will doubtless multiply. The latest application announced is to the departure and arrival train indicators at Paddington station. In all such cases too much importance can hardly be attached to the preservation of contrast and the complete conversion of the available radiation.

Obituary

R. J. Lythgoe

We record with great regret the death of Dr. R. J. Lythgoe, who had served on the Council of the Illuminating Engineering Society and was well known as a brilliant investigator in connection with light and vision. His paper on "Visual Perceptions Under Modern Conditions," read before the Society in 1935, which was the first contribution to appear in the "Transactions," was regarded as an admirable summary of recent work in this field. He had previously been responsible for much research which was valued highly by physiologists, amongst whom he held a unique position as one of the very few experts equally conversant with this subject from the physical and the physiological side. Dr. Lythgoe was a member of the Home Office Committee responsible for the framing of the Fourth Interim Report on Lighting in Factories and Workshops. His undoubted gifts were united to a quiet and unassuming manner and a most likeable disposition. It is to be feared that his loss leaves a gap that will not readily be filled.

Synthetic Reverberation

How the Decay of Phosphorescence is applied to control sequences of echoes in Broadcasting Studios.

A highly interesting application of phosphorescence was mentioned by Mr. R. Brewer at the last meeting of the Illuminating Engineering Society on April 9—its use to achieve synthetic reverberation in broadcasting studios.

This device has recently been described in a contribution by P. C. Goldmark and P. S. Hendricks.* The phenomenon of reverberation, they point out, is so common in every-day life that familiar sounds produced without it sound unnatural. If an orchestra performs in a studio only just large enough to accommodate players and instruments, and relatively small compared with a concert hall (to the acoustic effects of which the public has become accustomed), the effect seems unsatisfactory, because of the dissimilarity in reverberation characteristics.

It was natural, therefore, to seek some means of producing a "synthetic reverberation," the exact nature of which could be modified according to the particular item and conditions of broadcasting. Reverberation indoors consists of many reflections from diverse surfaces, and has thus a very complex sound structure. The approximate reverberation time (defined as the time necessary for a sound to decay to one-millionth of its orginal value) desirable for typical studios and auditoriums has been determined. The device now described provides for a maximum reverberation time of 2.5 seconds, which is ample for every-day use. The artificial reverberation, once produced, is then mixed electrically with the original signal in the proper proportions to get the desired effect.

The reverberation is achieved by repeating the echo forty or more times with a logarithmically decreasing amplitude. The device described utilises the convenient property of phosphorescence, excited in a suitable substance by irradiation with a mercury lamp, of dying away according to a similar logarithmic law. The newly developed high-pressure, capillary-type mercury lamp is used as the source. Its light penetrates a slit and excites the surface of a rotating disc, coated with a suitable phosphor. At a later stage the residual phosphorescence, emitted through a similar slit, excites a sensitive photo-cell and creates the desired sound impulse. By adjusting the modulation of the light and varying the speed of the disc wide variations in reverberatory effect may be obtained. The exact treatment of the lamp, however, required study and somewhat special methods of achieving the modulation were ultimately found necessary. The choice of the phosphorescent medium also requires care. A material having a rather slow decay time (several seconds) and giving light of a yellow-orange colour was preferred. It was also necessary to ensure extreme evenness of the coating with a view to avoiding extraneous noises ("bumps"), and to guard against possible deterioration of the surface owing to accidental contact.

A question that naturally occurs to one is how far the effect is permanent, i.e., whether the reverberations will suffer, owing to deterioration of the substance in course of time. It appears, however, that provided precautions are taken to ensure that it is not touched or contaminated no appreciable diminution in response has so far been noted.

No doubt, now that phosphorescent materials of good quality are readily available, other interesting applications will be discovered.

*Jour. of the Society of Motion Picture Engineers, Dec., 1939, p. 635.

A small assembly bench illuminated by Mazda fluorescent lamps in industrial reflectors.

Lighting with the New Fluorescent Tubular Lamps

We are indebted to the British Thomson-Houston Company, Ltd., for the accompanying illustrations showing some of the first installations of the new fluorescent tubular lamps described in our last issue (March, p. 51). These 5 ft. 80 w. lamps operate at about 32 lumens per watt, and yield a white light closely resembling normal daylight. High illuminations can be readily secured, but equally important is the excellent diffusion and soft effect of the light, coming as it does from a relatively extensive source of mild brilliancy.

The picture above shows the application of the lamps mounted in appropriate industrial reflectors above an assembly bench. The absence of shadow is helpful in enabling fine assembly to be carried out with ease and accuracy.

The other picture shows the application of the system, in a more decorative way, to a furniture showroom. Here, as in art galleries and elsewhere, the correct appearance of colours by this form of "artificial daylight" is of importance. Another use for which the lamp is specially suited is the lighting of drawing offices where the draughtsman desires a soft and even illumination free from apparent shadow.

A furniture store with permanent "daylight" furnished by fluorescent units.

National Illumination Committee of Great Britain

(Affiliated to the International Committee on Illumination)

ANNUAL REPORT FOR THE YEAR 1939

(Slightly Abridged)

The work of the National Committee and of the various sub-committees during the past year has been concerned mainly with final preparations for, and participation in, the plenary meeting of the International Commission on Illumination which was held in June at Scheveningen, in Holland. The meeting was presided over by Prof. Ch. Fabry, of France, and it was attended by about 400 delegates from fifteen different countries. The British delegation, which included twenty-one members of the National Committee, numbered about seventy, and was the largest which the Committee has so far sent abroad; apart from the Dutch, it was also the largest delegation present at the meetings.

The excellence of the arrangements made by the Dutch National Committee for the various meetings and also for the visits and excursions of technical interest was much appreciated by the visitors.

In addition to the two general sessions, there were twenty-four meetings of technical sub-committees to each of which British delegates had been appointed to represent the National Committee. In all cases, these delegations were able to offer valuable contributions to the discussions and to assist in formulating resolutions. For a number of subjects, the meetings were arranged to be of the congress type, at which original papers were presented. Here, again, the National Committee was able to participate, and three papers were presented by members of the British delegation. In the case of four subjects, viz., Glare, Street Lighting, Classification of Light Distributions and Theatre Stage Lighting, the National Committee acted in a secretariat capacity and was responsible for the preparation of the report on each subject.

The work of nearly all the technical committees was summarised in the form of official resolutions, which were approved at the final meeting of the session. The Commission decided that there was no need to change the internationally-agreed visibility values for the standard observer, the validity of which had been questioned in some quarters.

It was decided that the study of Diffusing Materials should for the time being be discontinued, and that the Calculation of Beam Intensity of Projector Systems should be introduced as a new subject of study. The title "Museum Lighting" was substituted for the more general "Architectural Lighting," while Artificial Daylight was included with Colorimetry. Changes were also made in the allocation of secretariat responsibility. The subjects now being studied, together with the secretariat country, are as follows:—

	Subject.	*Secretariat.*
1a.	Vocabulary	Switzerland.
1b.	Definitions and Symbols	France
2 & 3.	Units and Standards	Central Bureau
4.	Light and Vision	France
5.	Visual Photometry	Hungary
6.	Physical Photometry	Poland
7.	Colorimetry and Artificial Daylight	Germany
21.	Light Sources	Great Britain
22b.	Classification of Light Distributions	Hungary
23a.	Street Lighting	U.S.A.
23b.	Automobile Lighting	Italy
25.	Museum Lighting	Spain
26a.	Aviation (Ground) Lighting	Holland
26b.	Aircraft Lighting	France
26c.	Traffic Signs	Switzerland
26d.	Calculation of Beam Intensity in Projector Systems	Great Britain
27.	Natural Daylight	Germany
29.	Mine Lighting	Belgium
41.	Ultra-violet Light	Holland
62a.	Lighting Education	Germany
62b.	Lighting Practice	U.S.A.
62c.	Voltage Fluctuations	Italy
62d.	Cinema Lighting	Germany
62e.	Theatre Stage Lighting	Great Britain

At the concluding meeting of the Commission, Dr. N. A. Halbertsma (Holland) was elected as the new president. Vacancies in the offices of vice-president were filled by Mr. E. C. Crittenden (U.S.A.) and Prof. Perucca (Italy). Dr. C. C. Paterson (Great Britain) and Mr. A. Filliol (Switzerland) were re-elected honorary secretary and honorary treasurer respectively.

It is with regret that the Committee has to record the death of Mr. H. W. Gregory, who has represented the Institution of Electrical Engineers since 1933. He has been very active in his support of the work of the Committee. Mr. C. A. Masterman, who represented the Institution of Gas Engineers, has been succeeded by Mr. G. Dixon, and Mr. A. Watson, of the Air Ministry, by Mr. W. J. F. Wellard. Mr. Masterman's position as a representative of the National Committee on the Executive Committee of the International Commission on Illumination has been filled by Col. Edgcumbe, the chairman of the National Committee.

Once more the Committee wishes to express its appreciation of the continued interest of the contributing associations, the Illuminating Engineering Society, the Institution of Electrical Engineers, and the Institution of Gas Engineers, whose financial support enables the Committee to participate in the activities of the International Commission. The thanks of the Committee are also due to the British Standards Institution and to the National Physical Laboratory for continued co-operation in the technical work.

K. EDGCUMBE,
Chairman.

The Photometric Properties of Luminescent Materials

Summary of a paper read at the meeting of the Illuminating Engineering Society, held at the E.L.M.A. Lighting Service Bureau (2 Savoy St., London, W.C.), on April 9th.

There was a good attendance at the meeting of the Illuminating Engineering Society, held at the E.L.M.A. Lighting Service Bureau on April 9, when a paper on the above subject was presented by W. E. Harper, Margaret B. Robinson, and J. N. Bowtell. (Incidentally, it was remarked by the President during the proceedings that this appeared to be the first occasion on which a lady had co-operated in a joint paper, though not the first time that a lady had read one—one instance being the paper on Neon Signs presented by Miss Dorothy Partridge in 1924.)

In introducing his subject Mr. Harper referred to important recent developments in fluorescence such as the new tubular fluorescent lamp, which was on exhibit in the lecture theatre, and was examined with much interest by those present. He also referred to the application of such materials to A.R.P. work, and the necessity of a means of accurately estimating their capabilities.

Luminescent materials may be roughly divided into two classes (a) those showing strong fluorescence but phosphorescence of only short duration, and (b) those yielding phosphorescence which persists for a considerable time—in some cases so long as to give an evident brightness after twelve hours. Besides the mineral substances (sulphides, etc.) there are now organic materials to consider. The authors showed a range of fabrics dyed with such substances yielding a wide variety of vivid colours. Luminescent materials may be applied in solid form as a paint or as an ingredient in vitreous enamel, synthetic resins, etc. In the case of paints the crystalised structure of the active material must be carefully preserved, and great care must be used in mixing the active substance with its vehicle, which must be transparent to U.V. radiation, and unaffected by moisture. A transparent protective layer may be added in the case of material used out of doors. The authors also showed by experiments how useful the "backing seal" may be in increasing the available brightness.

Reference was next made to the available sources of ultra violet light, such as mercury lamps in black glass bulbs, overrun tungsten lamps with special filters, small lamps filled with argon, etc., the comparative effects of which were illustrated.

The important influence of the Purkinje effect on the appearance of coloured surfaces of low brightness and on decay curves was emphasised. Two surfaces of widely different colours of apparent equal brightness initially may appear very different when the glow has faded and become weak—the green and blue end of the spectrum becomes outstanding at low illuminations, whilst the red fades out. Experiments shown by the authors illustrated the effect of density of material on brightness. In some cases greater concentration may also result in a deepening of colour. Ingenious experiments were shown to prove that the inverse square law applied to fluorescence, i.e., that the brightness is proportional, within wide limits, to the distance of the source. This, however, does not apply to phosphorescence for which there is a certain saturation exposure. This was shown by the creation of a bright patch, owing to extra stimulation, in the centre of the luminous area, which ultimately faded into the same condition as its surroundings. Other factors of some importance included temperature, though it seems that at ordinary room temperature there is little variation in results.

In regard to life it was pointed out that not a great deal of experience is yet available. Nevertheless, it would appear that in the case of properly prepared zinc sulphide, the loss in power does not exceed about 20 per cent. in five months, whilst with more sensitive materials it may be as large as 50 per cent., and with organic materials even greater.

A final experiment showed how data can be assembled to enable the lighting engineer to predict what the resultant brightness with a given fluorescent material and a given stimulation should be, and the value of such information in connection with fluorescent lighting installations was emphasised.

There was an interesting discussion, opened by Dr. C. C. Paterson. Some of the contributions dealt with rather intricate photometric problems. It was asked whether the inverse square law applied right down to zero and whether it was necessary to wait a little time to get full saturation with fluorescent effect.

In reply it was explained that the period necessary for full excitation is not great, probably less than one minute. Photometric difficulties arise not only from the very low order of brightness to be measured, but also the overpowering influence of the Purkinje effects in these circumstances when widely different colours have to be dealt with.

There was also some discussion on the period of useful life that can be obtained from phosphorescent materials—apparently twelve hours was regarded as a somewhat optimistic figure—and it was emphasised how important in this connection is the purity of materials. For example, the presence of one part in a million of iron may have a fatal effect. In the course of the discussion a curious and interesting application of phosphorescent materials—to the artificial production of reverberation in Broadcasting studios—was mentioned by Mr. R. Brewer. This is the subject of reference elsewhere in this issue (p. 59).

I.E.S. Informal Luncheon

Members of the Illuminating Engineering Society are reminded of the **Informal Luncheon,** to take place at St. Ermin's Hotel, Westminster, at 1 p.m., on **Tuesday, May 7.** Application for tickets (5s. 6d. each) should be made without delay.

The **Annual General Meeting** will take place on the same day at **5.30 for 6 p.m.,** and will be held at the E.L.M.A. Lighting Service Bureau (2, Savoy-street, London, W.C.2).

Reviews of Books

Modern Factory Lighting. (Issued jointly by the British Electrical Development Association and the E.L.M.A. Lighting Bureau, 2, Savoy Hill, London, W.C.2. 8s. 6d.)

This useful book combines a discussion of factory lighting with hints on meeting special war-time requirements. There are six chapters dealing respectively with the Purpose of Factory Lighting, Factory Lighting Legislation, Choice of Light Sources, Design of Interior Lighting Installations, Special Industrial Lighting Problems, and War-time Control of Factory Lighting. Some of the matter in the earlier chapters, such as the analysis of the purpose of factory lighting and the explanations of the planning of installations, will naturally be familiar to experts, but the matter is very clearly and simply put and should be welcome to industrial users of electric light. Of special interest are the two final chapters. The discussion of special problems is illustrated by many effective pictures, those showing the devices to facilitate recognition of flaws in polished material and the application of directional lighting to special processes being particularly clear and useful. The final chapter meets an evident want by assembling in a small compass information relating to war-time restrictions and suggestions how to meet them, crystallising much scattered data to be found in lighting orders and A.R.P. specifications.

Examinations in Illuminating Engineering

Information has recently been issued in regard to the first examination in Illuminating Engineering (Intermediate Grade) held in 1939. Of the twenty-nine candidates, nine passed in the first class and thirteen in the second. Of those competing, the majority entered from the Northampton Polytechnic (ten) and the L.C.C. South-East London Technical Institute (eight). Considering that this is the first occasion on which the examination has been held the entry is not discouraging. Granted normal conditions, the number would doubtless grow progressively year by year.

At the moment circumstances naturally are not very favourable to the holding of examinations for those entering upon their careers. We are glad to note, however, that the City and Guilds Institute is proposing to carry on, their examinations being held on the dates assigned in the published calendar for 1940—except in a few special cases involving practical tests and specimen work, where some modification in arrangements may be found necessary.

Although the number of candidates has no doubt diminished somewhat, the examinations in Illuminating Engineering are being duly held this month—the "Intermediate" on April 29 and the "Final" on April 29 (Section A) and April 30 (Section B).

The City and Guilds Institute is certainly to be commended for persevering with their programme despite war conditions, and especially for initiating the Final Examination—which is being held for the first time this year.

At the present moment it may be of interest to give some account of the questions set for the Intermediate Examination in May last year. The questions covered a wide range. As candidates were only asked to attempt nine out of fourteen (the maximum marks for each being the same), they had every chance of selecting topics with which they were familiar.

Of the questions set, the initial four dealt with "fundamental" matters. In (1) candidates were asked to state the temperature at which a tungsten wire in vacuo commences to glow in the dark, to draw a diagram showing the distribution of energy with regard to wavelength at this temperature, and to show to the same scale the corresponding graph for a tungsten filament at normal operating temperature—marking the limits of the visible spectrum.

In (2) it was required to define "specular" and "diffused" reflection, and to trace the path of a beam of light through a clear glass plate; also to explain the quantitative connection between reflection, absorption, and transmission.

No. (3) involved the preparation of a diagram of the human eye, showing its chief optical parts, and a sketch showing how the image of a pencil 5 in. high and 10 in. from eye is formed on the retina. No. (4) required definitions of "persistence," "adaptation," and "fatigue," and descriptions of experiments illustrating two of these phenomena.

The next four questions were concerned with photometry and simple calculations. No. (5) was arithmetical, involving merely a knowledge of the inverse square law and the relation between candle-power and flux. No. (6) required descriptions of two types of visual photometers, No. (7) the construction, from data supplied, of a Rousseau diagram and the determination of mean spherical and mean hemispherical candle-power. No. (8) called for definitions of "daylight factor" and "sill ratio," and an analysis of factors influencing access of daylight into a room, illustrated by an example.

Nos. (9) and (10) dealt respectively with gas and electric sources, an illustrated explanation of the action of a gas-burner and some data on modern electric lamps being required. In No. (11) candidates were asked to state the illumination requisite for various purposes (a kitchen table, a draughtsman's table, etc.), and to discuss other considerations relating to proper lighting in the various instances. No. (12) set a problem in regard to calculations of gas consumed and lumen output on a gas-lighted roadway.

No. (13) asked for a discussion of the three-wire system of electrical distribution, and No. (14) a statement of the factors determining charges for gas and electricity for lighting.

Fluorescent Effects for Showroom Display

The accompanying illustration shows one of a number of attractive demonstrations, making use of fluorescence, recently carried out by the General Electric Company, Ltd., for the Yorkshire Brick Company at their Doncaster headquarters.

These new showrooms consist of four three-walled rooms, entirely constructed from bricks. The "fluorescent room" here pictured is got up as a garden loggia. The pointing of bricks, the pillars, and the panels are washed with fluorescent paint. Other fluorescent effects are embodied in the treatment of the window lighting, and the furniture, flowers, and foliage. A sheet of orange-yellow rhodoid behind the leaded window produces a cheerful glow. The flower-bed contains realistic glowing delphiniums, nasturtiums, pansies, and anemones—and the same treatment is applied to the wistaria and climbing Alexandra rambling rose. All are made to glow in appropriate colours by means of two concealed black lamps in Gecoray reflectors.

Special Industrial Lighting Problems

At a meeting of the Nottingham Sub-Centre held on March 15, it was announced that Professor H. Cotton had been elected Chairman for the coming session and that Mr. E. G. Phillips, Mr. G. D. Johnson, and Mr. W. Jackson had been elected to fill vacancies on the Committee.

Mr. R. O. Ackerley then gave an address on "Special Industrial Lighting Problems." He dealt first with the problems involved in the design of fittings for use in corrosive and explosive atmospheres. For the latter purpose three alternative arrangements were indicated: (a) fittings located outside the building altogether, (b) lamps in concentrated reflectors placed inside the building but outside the actual spraying booth, and (c) flameproof fittings mounted inside the danger area.

The next problem was the provision of artificial daylight for processes in which accurate colour matching was involved. Alternatives here included (a) daylight lamps, the applications of which were limited owing to the high absorption of light and relatively poor approximation to the spectrum of daylight; (b) lamps equipped with special colour filters which, whilst giving better colour rendering, absorb much light, the efficiency being of the order of 2 lumens per watt (such units have the further drawback that owing to ageing of the filament lamp and voltage variations the quality of light is not quite constant); (c) tubular sources utilising luminescent carbon dioxide: this is considered the best form of artificial daylight as regards quality but operates at a somewhat low efficiency; and (d) the mains voltage fluorescent tubular lamp, which, whilst not so accurate as the CO_2 tube, gives a very good colour and has a high efficiency, estimated at about 35 lumens per watt.

Mr. Ackerley then dealt at some length with problems involving the direction and diffusion of light, amongst which he mentioned the inspection of tin plates. By providing surfaces of high and even brightness which were reflected in the polished surface of the tin, it was impossible to detect minute flaws and indentations. On the other hand, for the examination of threads and fabrics directional lighting was needed in order to create shadows which showed up the nature of the material.

Other special processes, illustrated by numerous lantern slides, included the manufacture of margarine and fish pastes, paper making, printing, etc. It was inferred that the illuminating engineer could solve any special problem provided he had the confidence of the works engineer and was given access to all the details relative to the particular process considered. This stipulation, however, was a very important one.

In the subsequent discussion Mr. R. G. Payne emphasised the influence of the economic factor in determining the choice of equipment. Too often, after getting the best advice, one found that a customer was influenced mainly by the question of cost, and the results were reflected in the quality of the work. He, himself, had the greatest confidence in reputable manufacturers of equipment and accepted the performance figures given by them. Such confidence saved the contractor a great deal of worry. He agreed that co-operation between the lighting expert and the user was of the utmost importance.

In reply to a question raised by Mr. Howard Long, regarding the use of open type reflectors in the vicinity of spraying booths inside the building, Mr. Ackerley mentioned a distance of twenty feet as being permitted by the authorities. Mr. Hacking gave further examples of the value of directional lighting, for example, in revealing grooved lettering on tablets, etc. Other points raised included the alleged stroboscopic effect of fluorescent lamps (which the lecturer declared was merely a "bogy"), the inspection of bottles of liquid, etc. A vote of thanks to the lecturer terminated the meeting.

Signs in Shop Windows

A Handy Apparatus for Testing Brightness

It will be recalled that, in the latest version of the Lighting Restrictions Order (Emergency Powers Defence Order, No. 74), conditions relating to the exhibition of signs in shop windows, etc., are specified. One of the most important of these is the limitation of brightness, which should not exceed 0.02 ft.c.

Hitherto, however, it must be owned that this condition has been very frequently violated in parts of London. Signs of much greater brightness are habitually exposed, and in provincial cities the departure is even more widespread. The explanation of this is quite evident—the ordinary police officer and, for that matter, the shopkeeper have hitherto had available no ready means of testing the brightness of the sign. This test can, of course, be made with photometric instruments, but such apparatus is not generally available, nor are members of the public conversant with its use.

This need seems likely to be met by a simple and effective device prepared by a member of the Illuminating Engineering Society and constructed by the Engineering Department of the Metropolitan Police, which was recently demonstrated to us at the Home Office Industrial Museum. The apparatus consists simply of a robust metal case with an opal plate illuminated to the prescribed brightness by a small-glow lamp behind, fed by an accumulator. In front of the illuminated plate is a frame with slots in it. It is also possible to secure a similar brightness with blue and red light by folding over appropriate colour screens (the necessary adjustment to secure the correct brightness can be made by means of a small resistance, the manipulation of which is indicated by a dial in the back of the instrument).

The device is so solidly constructed as to withstand rough usage. It can be carried by a police officer or slung on his belt. In any case of doubt the brightness of the sign may be judged by simply holding up the test box beside it for comparison, and no doubt officers will use their customary discretion (De Minimis Non Curat Lex!) and would only take action when the specified brightness was obviously and definitely exceeded. The device is intended to eliminate large variations in brightness in comparison with which errors in the apparatus would be of minor importance.

Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from page 48, March, 1940.)

I.—RADIATION AND GENERAL PHYSICS

88. Physics in the Glass Industry.

W. E. S. Turner. Nature, Vol. 145, No. 3,673, p. 446. March 23, 1940.

A summary is given of the services rendered by physics to the development of the glass industry. R. G. H.

II.—PHOTOMETRY

89. A Precision Flicher Photometer.

G. Timoshenko, W. J. Glasson. Am. Illum. Eng. Soc. Trans., pp. 162-168, February, 1940.

A photoelectric flicher photometer, using a null method of measurement, is described. It has been developed for measurement of the optical density of thin metallic films. J. S. S.

90. Light Meter Checking Device.

Anon. El. World, 113, p. 758, March 9, 1940.

The need for a simple device for the checking of photoelectric light meters is pointed out, and a simple arrangement, using a standard lamp, is described. S. S. B.

91. A Graphical Method of Finding Illumination Values from Tubular, Ribbon, and Surface Sources.

E. H. Wakefield. Am. Illum. Eng. Soc. Trans., pp. 142-150, February, 1940.

A graphical method of solving problems of illumination distribution from linear and surface sources is presented. Three problems are given as examples. J. S. S.

III.—SOURCES OF LIGHT

92. Arcs—Their Operation and Light Output.

W. E. Forsythe. Am. Illum. Eng. Soc. Trans., pp. 127-141, February, 1940.

The development of the open carbon arc is discussed, with particular reference to arc temperature, constancy of output, and noise in modern equipment. The high-pressure mercury arc lamp is also described, and data is given relating running conditions to brightness and spectral distribution. J. S. S.

93. Electric Discharge Lighting.

R. O. Ackerley. Elect., 124, p. 206, March 15, 1940.

A summary is given of a recent paper by the author on the economics and application of electric discharge lighting for industrial purposes. C. A. M.

94. New Fluorescent Lamp.

Anon. Elect., 124, p. 193, March 8, 1940.

A description is given of a new 5-ft. 80-watt tubular fluorescent lamp now available. C. A. M.

95. Merits of the New Lamp.

"*Pharos.*" Elect., 124, p. 240, March 29, 1940.

The new 5-ft. tubular fluorescent lamp consuming 80 watts is discussed in detail. C. A. M.

IV.—LIGHTING EQUIPMENT

96. New Electrical Products.

Anon. El. Rev., Vol. CXXVI., No. 3251, p. 317. March 15, 1940.

Describes a street lighting fitting complying with BS/ARP/37 which embodies some novel features and also a new study lamp. R. G. H.

97. Large Size Non-Rotating High-Intensity Carbons and their Application to Motion Picture Projection.

D. B. Joy, W. W. Lozier, R. W. Simon. J. Soc. Mot. Pict. Eng., Vol. 34, p. 241. March, 1940.

Describes the operating conditions for high current non-rotating carbons employing a reflector optical system. Substantially higher illuminations (up to 100% increase over present practice) are obtainable with the optical system described. R. G. H.

98. Modified Street Lighting.

Anon. Elect., 124, p. 194. March 8, 1940.

Descriptions with photographs are given of two further examples of approved street lighting fittings. C. A. M.

99. Photos Solve Light Projection Problem.

E. R. Fletcher. El. World, 113, p. 772. March 9, 1940.

The problem of determining the shape of mask to be used in a light projector to illuminate a particular area of a curved wall was solved by taking a photograph of the area from the position in which the spotlight was to be mounted. Details of the procedure are given. S. S. B.

100. Paint Reflection Tests with Mercury and Incandescent Lighting.

Anon. Elect. Engineering, 59, p. 62. February, 1940.

Results are quoted of a number of tests on surfaces painted with twenty-one different commercial tints, under both mercury and incandescent illumination. The average reflection factor under the mercury light was slightly higher than that under incandescent filament light, but reddish tints were lower for the mercury light. S. S. B.

101. New Indirect Luminaire Improves Drafting-Room Illumination.

F. P. Kuhl. Elect. Engineering, 59, p. 68. February, 1940.

A new design of indirect lighting fitting is described, which uses a silvered-bowl lamp and a set of louvres. In an installation in a drawing office over 60 per cent. of the light flux reached the working surface, the absorption of the louvre system being only 7 per cent. An illumination of 30 ft.c. was chosen as most suitable after trial with values from 20 to 60 ft.c. on the drawing boards. The feature of the design is claimed to be adaptable to other types of fittings. S. S. B.

V.—APPLICATIONS OF LIGHT

102. Light and Architecture.

Anon. Am. Illum. Eng. Soc. Trans., pp. 121-126. February, 1940.

Some representative architectural lighting schemes are described with photographs. J. S. S.

103. Light in the Black-Out.

J. B. Harris. Elect., 124, p. 238. March 29, 1940.

A discussion is given on the use of modern light sources for domestic lighting. C. A. M.

104. Outside Lighting in Paris.

Anon. El. Rev., Vol. CXXVI., No. 3252, p. 338, March 22, 1940.

A description is given of the system of control used in Paris for operating all outdoor lighting. A low level of illumination is permitted, which is switched off when an air-raid warning is received. An A.R.P. fitting is described which is fitted with adjustable screens by means of which the light distribution from the fitting may be varied. R. G. H.

105. Luminous Ceiling Gives 100 ft.c. for Drafting.

Edwin D. Tillson. El. World, 113, p. 729, March 9, 1940.

A description is given of the lighting of a drawing office, using tubular luminescent discharge lamps in special trough housings, the whole arrangement taking the form of a saw-tooth artificial ceiling. This scheme was adopted after extensive experimental trials of different types and locations of units, and replaces a totally indirect installation. Full details of the scheme are given. S. S. B.

106. Better Lighting from Fluorescent Lamps.

Roy A. Palmer. El. World, 113, p. 318, January 27, 1940.

The use of "daylight" tubular fluorescent lamps in a lighting installation in a hosiery factory is described. Details of the installation are given, and an average illumination at the needle points of 50 ft.c. is claimed. These lamps are used largely throughout the factory, which is of the modern windowless type. S. S. B.

107. Lighting in a Tailoring Establishment.

Anon. El. Times, 97, p. 117, February 8, 1940.

Gives a photograph of a workroom lit by industrial dispersive reflectors mounted 9 ft. above the floor: the illumination is stated to be about 15 ft.c. W. R. S.

108. Fading of Dyed Textiles by Radiant Energy.

M. Luckeish, A. H. Taylor. Am. Illum. Eng. Soc. Trans., pp. 169-172, February, 1940.

A summary of some previous work on fading is given, and this is extended by data on the fading of materials exposed to fluorescent daylight tubular lamps. The rate of fading does not appear to differ materially from that with tungsten filament lamps, but further tests are needed to confirm this. J. S. S.

Recent Patents

(Abstracts of recent Patents on Illumination & Photometry.)

No. 513,207. "Improvements in or Relating to Gas Lamps for Street Lighting and Similar Purposes."

Kempton, C. H. A., and O'Leary St. Clair, J. P. C. Dated March 24, 1938.

This specification deals with a street lighting fitting closed at the top and on the sides, having a bottom opening only for the emission of light. Inside reflectors are provided at least partially surrounding the light source—a multitude of gas burners—in a lateral sense. These reflectors are arranged symmetrically to the light source in such a way that a line extending from the centre of one section to the centre of its corresponding opposite section passes through the light source. By adjusting the sections of an opposed pair of reflectors the light, which would normally be emitted laterally, will tend to be reflected from the respective reflectors and kept in the path of light projected through the bottom.

No. 513,214. "Improvements in or Relating to Methods of and Apparatus for Heat Treating Filaments."

The British Thomson-Houston Company, Ltd. Dated March 30, 1937. *(Convention.)*

This specification refers to a method and an apparatus for heat treating single and multiple coil filaments separately at high temperatures for a relatively short interval of time. Prior to this invention two processes of heat treatment were known: One provided for the filaments in a continuous thread to be passed through the furnace; the second provided for the filaments, severed to length, to be piled on boats of considerable size before entering the furnace. In both cases the mandrels were left inside as a safeguard against distortion. The mass of these as well as the large sized boats interfered with uniform heating. It is the feature of this invention to provide for the heat treatment of the filaments separately while supported by means of such extremely small mass as not to affect materially time, rate, or uniformity of the treatment. The receptacle is shaped so as to hold one or more of the filaments, each in a separate groove, and is heated by a resistance coil into which it is inserted.

No. 513,223. "Improvements in Landing Lights for Use on Emergency Landing Grounds for Aircraft."

Newstead, H. W. Dated April 1, 1938.

This specification deals with a self-contained lighting unit, preferably of a spherical shape. A section of it shall consist of translucent material containing the light source and a reflector. Underneath the reflector an accumulator filled with a jellied electrolyte is fixed to feed the lamps, and in addition a counterweight of metal is provided to ensure that the apparatus will always assume a predetermined position, when left free to do so, with the lamps uppermost. This unit if struck by a landing 'plane will roll like a ball, but as soon as movement is stopped it will automatically return to its operative position. A longitudinal shape is also described to act as a direction indicator.

No. 513,238. "Improvements in or Relating to Photographic Films."

Tennant, W. J. Dated April 4, 1938. *(Communicated from Du Pont Film Manufacturing Corporation, U.S.A.)*

This specification refers to photographic films as available for use in normal photography, i.e., films to be made of materials having a cellulosic base, as cellulose esters, ethers, etc. Such films are hygroscopic and expand when subjected to processing baths, moreover, when dried, they fail to resume their original uniform state and tend to "cockle." It is the aim of the invention to make such films moisture-proof and free from the tendency to "cockle." This is effected by providing a moisture-proofing layer between the film support of cellulosic material and the light-sensitive emulsion layer. The moisture-proofing layer is being formed by applying a solution containing a polymer and drying off the solvent. To prolong the life of the moisture-proofing layer a plasticiser, e.g., dibutyl phthalate, may be included with the polymer.

No. 513,249. "Improvements in Electric Incandescent Lamps."

N. V. Philips' Gloeilampen-Fabrieken, Holland. Dated December 18, 1936.

The invention refers to lamps of the mirrored type to be used for illumination of large surfaces near to their (concealed) working position. In cornice lighting systems hitherto the lamps have usually been arranged under a slight angle to the surface to be lit. This had several advantages, i.e., fairly large dimensions of lamp plus holder, uneven illumination on the surface the brightest spot being generally close to the lamp, and unsatisfactory distribution along the axis of the bulb's width. The improved bulb according to the invention is specially designed for use in cornices and has its neck axis arranged under an angle of 75° or more with the longitudinal axis of the bulb body to save space. In one form the bulb body is shaped in parabolas the axis of which, reckoned in a meridian plane, make a slight angle with each other and extend so as to form an angle of approximately 80° with the axis of revolution of the bulb body. The lamp's working position shall be perpendicular to the surface to be illuminated. Hereby it will be ensured that the candle power increases as the angle of incidence decreases.

No. 513,283. "Improvements Relating to Illuminating Apparatus."

Curtis Lighting Company of Great Britain and Bush, W. E. Dated April 6, 1938.

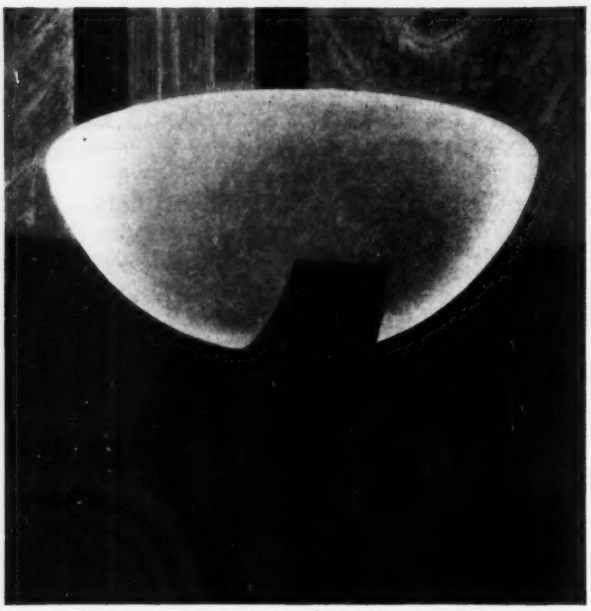
The lighting fitting according to the invention is designed for the illumination of benches, assembly lines, etc. Its main object is to provide for a well controlled indirect lighting avoiding glare and dark patches on the working plane. The fitting consists in its main parts of an elongated hood-reflector made up of flat zones running parallel to the long axis of the reflector. The ends of the hood are closed by flanged covers. The lamps are fixed to the hood perpendicular to the working plane and encased by shields intercepting and re-directing all light emitted from the lamps in a downward or lateral direction.

Vitreosil Wall Lighting Fitting

(The Thermal Syndicate, Ltd.)

Domestic lighting by means of fittings attached to walls has been revived in recent years primarily from the decorative aspect. At the present time the method should also be considered from the point of view of obscuration. Most living-rooms are centrally lighted by a comparatively powerful lamp, which has in many cases been heavily shaded to prevent passage of light through curtains. Wall lights, on the other hand, can be fitted where most needed, e.g., over fireplaces around which most domestic activities centre and where light is most needed. They can also be of smaller power. Further, when the shade consists of a material giving good diffusion obscuration is facilitated.

"Vitreosil" is such a material, and the British manufacturers of this product are marketing a complete electric wall fitting which is illustrated. The design originated in the



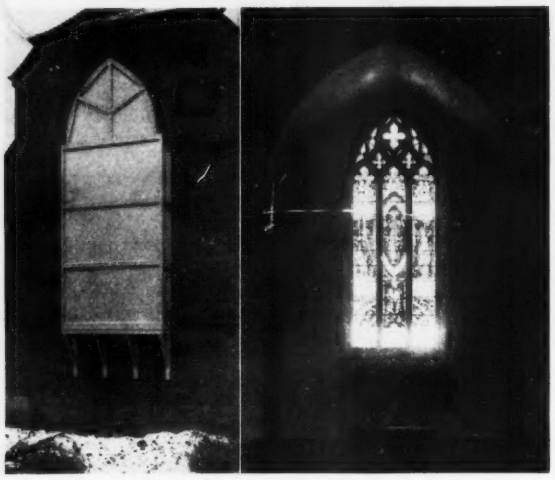
works of French friends of the company, Messrs. Quartz and Silice, of Paris.

The support is of stained oak, Jacobean finish, and can easily be suspended from a wall. The Vitreosil shade has a characteristic grained outside surface giving a very pleasing effect, and as no piece is exactly like another an individuality is obtained which cannot be achieved by other materials. This is true also of the interior surface, which in its natural condition is lustrous and satin-like, and acts as an efficient diffuser, giving even distribution of the reflected light. In the natural white finish the fitting will suit almost any scheme of decoration, but tinted bowls can be supplied. The price, including bowl, is 30s.

War-time Protection of Stained-Glass Memorial Windows

The protection of stained-glass memorial windows, sometimes of great beauty and value, is often a serious problem for church authorities. An interesting case is afforded by one in Harpenden Methodist Church, where protection was combined with a lighting scheme to stimulate daylight effect.

The architects, in consulting Holophane, Ltd., on this matter, attached considerable importance to the correct rendering of colour values, and special care was devoted to this aspect in the scheme finally adopted. The interior of the box, serving as a black-out and for protection, was finished in a matt Chinese white colour. Lighting was effected by 150 w. gas-filled lamps mounted in special reflectors of prismatic design in turquoise blue ("Correctalite") glassware. In this way the desired reproduction of colour was attained.



Outside and inside views of the Memorial Window in Harpenden Methodist Church, where protection has been combined with special "daylight" illumination.

The problem of securing the requisite diffusion and even effect was complicated by the fact that certain sections of the window were exceptionally dark. For these regions supplementary reflectors, with a "cut-off," confining the additional light to these regions, but imperceptible from inside the church, were installed.

The scheme has proved very successful in realising the desired effect, and the appearance of the window to the congregation resembles the normal daylight view seen previous to the war.

The architects concerned were Messrs. Sedgwick, Weall and Beck, of Watford, and the scheme was designed by the Technical Service Department of Holophane, Ltd.

War-time Electric Street Lighting

There are now available quite a number of war-time street-lighting units, all complying with BS/ARP 37, and obtainable from leading firms in the lighting industry, most of which have been illustrated in recent issues of "Light and Lighting."

The effect of such units was well illustrated during the recent inspections in Westminster arranged by the Joint Lighting Committee. Other areas in London are either installing the lighting or are considering doing so. Amongst these may be mentioned Finsbury, where 400 units are being provided and 200 are already installed, and Hackney, where experiments are being made and street lighting costing £4,000 is being considered, St. Pancras, and West Ham.

In a number of the chief cities, such as Glasgow, Sheffield, and Leeds, experiments are also proceeding. A notable instance is Croydon, where all main roads, bus, and tram routes, and shopping centres are being treated, and where, in all, 1,886 units are involved. In Coventry lighting in the centre of the city to cost £6,000 has been recommended, and for Northampton 600 fittings are on order.

Other cities and areas in which installations have been commenced or are contemplated include Accrington, Ashton-under-Lyne, Bournemouth, Bristol, Burnley, Caernarvon, Chesterfield, Darwen, Darlington, Doncaster, Fleetwood, Hawick, Ilford, Plymouth, Reigate, Torquay, and Wolverhampton.

War-time Street Lighting by Gas

With over 800,000 gas lamps normally in commission in this country for street lighting purposes, it is not surprising to learn that already installations or sample installations of the new low-power gas lighting fittings are being erected for over 300 local authorities throughout the country. Many more councils are considering the matter.

The following are some of the districts normally lighted, partially or wholly, by gas, in which the gas undertakings or councils have already ordered from fifty up to 3,000 or more of the new gas lighting fittings:—

Between 500 *and* 3,000 *fittings ordered*:—

Bristol, Burnley, Coatbridge, Darlington, Finsbury, Leicester, Rotherham, Sheffield, Shrewsbury, Westminster.

Between 100 *and* 500 *fittings ordered*:—

Belfast, Bolton, Bradford, Crewkerne, Glasgow, Glastonbury, Hamilton, Kilmarnock, Lytham St. Anne's, Manchester, Newry, Northampton, Oldbury, Oswaldtwistle, Rochdale, St. Helens, Stourbridge, Stratford-on-Avon, Stretford, Wellingborough.

Between 50 *and* 99 *fittings ordered*:—

Birmingham, Blackburn, Blackpool, Coventry, Darwen, Eccles, Hinckley, Kendal, Loughborough, Malton, Neath, Nelson, Nottingham, Shaftesbury, Shirebrook, Wallasey, Wedmore, Wombwell.

It is learned that the Ministry of Health is prepared to entertain applications from local authorities in respect of expenditure incurred in installing the new type of street lighting. The period of the loan will not exceed five years.

St. Helen's Gas Department is installing gas "starlights" throughout the country borough. It is expected that about 3,700 gas units will be used. The local authority regards the lighting of the residential and side streets to be as necessary as that of the principal thoroughfares.

Hinckley Urban District Council has decided to obtain the necessary gas fittings to enable certain of the street lamps to be lighted.

The Urban Council has ordered 250 gas "starlight" fittings for the streets of Wellingborough and Finedon.

Salford's modified form of gas street lighting for the bus routes will cost £1,365.

NOTES ON ILLUMINATING ENGINEERING ABROAD

(Specially Contributed—H. L. J.)

United States.

The "Magazine of Light" reports the introduction of a new sunlight lamp. This is designed mainly for use in homes, but also on animal or poultry farms. It consists of a bulb containing a small mercury quartz capillary tube of the size of about half a cigarette, and a tungsten filament. The lamp uses 100 watts, but the dimensions of the bulb do not exceed those of an ordinary 60-watt tungsten lamp. The glass of the bulb serves to cut off the dangerous short waves of the mercury light. Nevertheless some caution is advised in the use of the lamp. After a few hours of exposure a slight "pinking" of the human skin will be noticed, the intensity of which is largely dependent on the reflector properties of the reflector and the distance of the lamp. The main operations of the lamp are: Service voltages of 110-125, emits 3,500 lumens, takes an initial current of 1.3 amps., and has an overall length 5⅝ in. As switching operations contribute to a large extent to the quick evaporation of activated material from the electrodes. The maker's guarantee for the lamp is not expressed in terms of the burning hours but by numbers of "applications." 400 applications are guaranteed which will, in general, cover a period of about one year.

Australia.

The growing interest in decorative lighting arrangements outdoors is reflected in articles published recently in the "Electrical Engineer and Merchandiser." The first quoted here refers to the arrangements for the Spring Carnaval, in Melbourne, a feature of which was the "Garden City," an area of 14 acres known for the rest of the year as Treasury Gardens. The grounds are crossed by two main avenues, one framed by elms, the other by fig trees. Both the avenues have been illuminated for the purpose, but on different principles. The elms have been flooded uniformly along the whole front with mercury light. Lamp, reflector and auxiliaries were fixed to a wooden base and housed in a piece of pipe, 18 in. dia., 3 ft. long, posted like a paper basket between two adjacent trees on the ground. In the case of the fig trees sodium and mercury lamps have been used alternately. These were mounted at a height of 15 ft., not to interfere with the illumination of trade displays in a position along the road. To light the floral carpets tungsten lamps of 1,000 watts were used, mounted 18 ft. high. As wiring material twin tough rubber cable had been chosen buried 6 in. deep in the lawns. Only where hidden from view the cable had been suspended. In the lake three illuminated water fountains have been provided. They consisted of an outer spray ring carrying ninety 1-16 jets, and within the same three sprays and one centre nozzle of ⅜-in. The fountains were supplied by a centrifugal pump with an output of 340 gal.p.min., driven by a 20 h.p. motor. The height of the fountains could be varied by hydraulic valves operated by can-controlled reduction gear. Each fountain was equipped with nine underwater floodlights, housing 250 watt lamps and three-coloured filter discs. A small artificial waterfall with two drops (8 ft. the upper and 3 ft. the lower) were illuminated with four mercury lamps of 400 watt each.

Floodlighting of beauty spots in the mountains of New South Wales has recently been carried out systematically by the Katoomba District Council —the Leura and Katoomba Cascades, the Orphan Rock, and the "Three Sisters," all of them well-known beauty spots in the "Blue Mountains." Altogether about 100 reflectors have been installed with tungsten lamps of a capacity ranging from 500 to 1,000 watts.

New Zealand.

As early as January, 1938, according to the "New Zealand Electrical Journal," the first steps were taken to plan and prepare the illumination arrangements for the N.Z. Centennial Exhibition. The frontage of the buildings to be illuminated extended nearly one mile and approximately thirty acres of grounds had to be dealt with. For this a total load of 1,000 kw was available. The greatest care has been given to the colour scheme. In general the avenues have been illuminated by mercury lamps with the exception of the centre avenue which was lit by sodium lamps. The frontages of the Exhibition buildings were uniformly floodlit in green. The Exhibition Tower, 150 ft. high, at the end of the sodium-lit avenue, is marked by three vertical lines of Neon, concealed behind metal shields. Its base is treated in different colours undergoing a five-minute colour cycle change. Ten of the pavilions have entrances treated with colour changing in the coves and trumpets introduced in the architecture. Where coves and trumpets are arranged in a series the colour scheme is so designed that each section is in a different period of the cycle, by which means the shape or form is picked out clearly and the adjacent colours appear particularly beautiful. In total about 17,000 tungsten lamps are being used, 200 discharge floodlights and nearly a mile of fluorescent tubing.

France.

M. Dourgnon reviews in "Electricité" the position of lighting under war conditions. Broadly speaking, all belligerent countries seem to deal with these problems on similar lines. In the field of indoor lighting, however, the French have gone somewhat different ways in particular with reference to shop window lighting. This line of lighting, in the opinion of the author, had apparently been forgotten altogether by the authorities when considerations to emergency lighting problems had first been given shortly before the war. After its start one was faced with the fact that some amount of shop window lighting had to be permitted if the commercial life of the nation were not seriously to be impaired. At present the authorities are generally as lenient as they can be without endangering safety. The main object of the restrictions at present in force is to prevent direct light to escape beyond the horizontal or down on the pavement in front of the window. The Department de la Seine permits a maximum illumination intensity of 2 lux on a vertical plane two metres in front of the window, but no special box arrangement as in this country is prescribed. All light available is to be thrown on the objects only. Background and walls of the window must be blank, and in no case lighter than "marine blue." If the objects exhibited are themselves dark as well, it is suggested that they be displayed against white paper cut out to corresponding dimensions, thus providing an effective contrast. To prevent light being emitted beyond the horizontal, sun blinds should be used. If those of exterior design projecting into the street are not available, indoor blinds moving along the glass should be provided. To diminish stray light reaching the pavement the ceiling of the window should be blackened. An alternative to blinds, black ribbons, fixed horizontally across the window in a somewhat louvre like pattern, are suggested. This is, however, less satisfactory, as it hinders to a considerable extent the penetration of daylight into the interior and also obstructs the views of observers outside the window.

National Physical Laboratory

A "Department of Light"

We learn that a new "Department of Light" has been formed at the National Physical Laboratory to comprise the former Optics Division of the Physics Department and the Photometry Division of the Electricity Department. Mr. T. Smith, F.R.S., has been appointed Superintendent of the new department as from April 1, 1940.

It will be generally recognised that the new arrangement is a much more logical one—especially in view of the great variety of work, no longer exclusively concerned with the measurement of light, which the "Photometry Department" has for some time undertaken.

It is also announced that Dr. E. H. Rayner has retired from the post of Superintendent of the Electricity Department, having attained the normal age limit, and has been succeeded by Mr. R. S. J. Spilsbury.

The Illuminating Engineering Society (U.S.A.)

Notes on Transactions (March, 1940)

NEWS: The first annual *I.E.S. Pacific Coast Conference* sponsored by the Southern California and San Francisco Bay Cities Sections of the Society will be held on April 26-27 in the Edison Building Auditorium, Los Angeles. The Southern California Section, I.E.S., in conjunction with the Western Institute of Light and Vision, are staging *a four evenings lecture tour in four cities* in their district on lighting subjects.—On February 1 the *American Lighting Equipment Association* has been formed. The present membership consists of eighteen fittings manufacturers, who collectively supply approximately 70 per cent. of the country's indoor lighting fittings requirements.—On May 25 the *Golden Gate Exposition will be reopened.* For this occasion the lighting arrangements have been overhauled and amplified. A total of one million dollars has been spent up to date on the lighting only.—The Chicago Lighting Institute arranged a *one-day "schooling" course on fluorescent lighting.* The bookings for the course, however, have been so heavy that it had to be repeated four times to enable all who booked to attend.—The G.E. headquarters in New York, a building of 616 ft. height, has been equipped with *four floodlighting units each giving a beam of 25 million c.p.* from a high pressure mercury (water cooled) lamp of 1,000 w.—Mr. A. F. Dickerson has received the *Charles A. Coffin Foundation Award* for his lighting the Golden Gate Exposition.

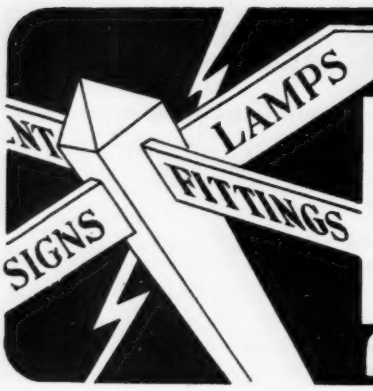
CONTRIBUTIONS: *Design of Built-in Luminaire Constructions for Safe Thermal Operation*, by W. Rosebraugh. The heat problems involved in built-in lighting have been made the subject of investigations and subsequently of specifications by the Underwriters' Laboratories, Inc. A wooden box arrangement is suggested for test purposes in dimensions corresponding to the size of the built-in fitting. The maximum temperatures permissible for different parts are given. The air temperature within the enclosure should not exceed 240° F. Various factors are analysed and the basis of calculation explained.

Saving Lives With Light, by R. T. Dorsey. Better and more widely distributed street lighting application is advocated with a view to accident prevention. The author, who is a member of the Los Angeles Traffic Engineering Bureau, points out that in that town 37.3 per cent. of all traffic fatalities occurred on certain streets having a total length of only 2.5 per cent. of the whole length of streets in that city. This indicates that if lighting improvements are applied to the right area benefits can be derived quite out of proportion to the capital invested.

Notes on the Behaviour of a Beam of Light in Fog, by L. M. K. Boelter and F. A. Ryder. The investigations to which this paper refers have been made with artificial fog. In some respects, it is pointed out, the conditions did not approach those of natural fog, but within limits the following findings are applicable to normal conditions: The flux reflected back in the direction of the source is a maximum, for the visible spectrum, in the short-wavelength region. An amber beam, obtained by filtering a white beam, does not, however, reduce the veiling effect of a luminous fog if the beam lumens are the same as for white light and the beams are otherwise similar.

Specifications for Testing Lighting Equipment. These are new I.E.S. Testing Specifications and constitute a report of the Committee on Lighting Service prepared by the Sub-Committee on Testing Specifications. They deal with luminaries for general lighting.

The make-up of this issue reflects the new methods being applied to the "Transactions" (now generally designated "Illuminating Engineer"), which provide for an illustrated cover and the inclusion of more notes on general developments. In accordance with the new policy recently adopted, providing for the early publication of convention papers, fourteen of the 1939 convention preprints have appeared in the "Transactions" for June, July, and August. Discussions of nine of these papers are now published.



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The Electric Street Lighting Apparatus Co., The Foundry, Canterbury.

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ENGINEERING & LIGHTING EQUIPMENT CO. LTD.
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FITTINGS FOR ALL PURPOSES

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DESIGNERS AND MANUFACTURERS OF MODERN LIGHTING FITTINGS.
CONSULT US ON ANY DECORATIVE, COMMERCIAL OR FLOODLIGHTING SCHEME.
TEL.: TERMINUS 5954.


MODEL 'B'

Lighting of the Main Control Room: Battersea Power Station

As originally designed the large laylights covering the ceiling admitted daylight but owing to wartime requirements these have been covered and now no daylight whatever enters the room from this source. This necessitated a replanning of the artificial lighting and when doing so it was decided to reproduce as nearly as possible the conditions that had reigned previously. The installation was planned by G.V.D. Illuminators Ltd. To illuminate the eight large laylights, covering an area of 5,700 square feet, a remarkably small number of lighting points, only twenty-eight in all, have been used. The photograph gives a good impression of the result. The illumination is extremely even, and free from glare and is practically shadowless. The absence of high lights on the dials and other instruments, a frequent source of trouble to shift engineers when artificial lighting is used, is particularly noticeable.

SIMPLEX "STARLITE" FITTING.—We learn that Simplex Electric Company, Ltd., are producing a new ("Starlite") street lighting fitting conforming with B.S. Specification B.S./A.R.P./37. The whole optical assembly is sealed in a clear glass cylinder, and is thus dust- and insect-proof, and can be easily detached and reassembled in a few seconds. A feature is the use of 15-watt lamps at all the mounting heights specified. Existing lanterns can be easily converted without rewiring, and a range of adaptors to meet all conditions is available.

CROMPTON PARKINSON, LTD.—Readers are familiar with the activities of Crompton Parkinson, Ltd., in the lighting field, and will be interested to note that this progressive firm recently became a member of the Electric Light Fittings Association, to which other leading manufacturers of lighting fittings belong. We understand that, in continuance of their present policy, they are not contemplating the addition of ornamental fittings to their range, but are concentrating upon industrial, commercial, and street-lighting fittings.

Index to "Where to Buy"

N.B.—The numbers are those attached to individual entries in the Directory (See pp. 72—73)